

Unit 3 Review Sheet: Work, Energy, and Power

1. Work:

- Variables (units): Work (Joules: J; $\text{kg}\cdot\text{m}^2/\text{s}^2$), force (N; $\text{kg}\cdot\text{m}/\text{s}^2$), displacement (m), theta (degrees).
- Force must have some component that is in the same direction as displacement, otherwise it is not scientific work.
- Equation.

2. Kinetic Energy:

- The energy of movement.
- Variables (units): Kinetic energy (J), mass (kg), velocity (m/s).
- Equation.

3. Potential Energy:

- Gravitational:
 - Related to the height above a set zero point.
 - We choose where the zero point is (make a convenient choice).
 - Variables (units): Potential energy (J), mass (kg), acceleration due to gravity (m/s^2), height (m).
 - Equation.
- Spring:
 - Stretching or compressing a spring stores some potential energy in the spring.
 - The zero point is at the spring's natural (or unstressed or unstretched) length.
 - Variables (units): Potential energy (J), spring constant (N/m), displacement (m).
 - Equation.

4. Work-Energy Theorem:

- Work is equal to the change in energy. Work being done *on* an object increases energy; work being done *by* an object decreases energy.
- Simple equation to begin with, but it becomes rather complicated when the kinetic and potential energies are included.
- Work may be done by non-conservative forces on a system, changing the energy of the system.
- Equation.

5. Conservation of Energy:

- Energy is conserved if we ignore non-conservative forces (friction, drag, applied).
- Initial energy is equal to final energy.
- Simple equation to begin with, but it becomes rather complicated when the kinetic and potential (both gravitational and spring) energies are included.
- Equation.

6. Power:

- Rate of work done on or by an object or system.
- Variables (units): Power (Watts: W; J/s), work (J), time (s).
- Equation.